

VISIT...

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ECE 5194.03 (Proposed): Group Studies in Neuroengineering and Neuroprosthetics

Course Description

This course gives an overview of the broad field of Neuroengineering for graduate and senior undergraduate students with engineering or neuroscience backgrounds. Focusing on neural interfaces and prostheses, this course covers from basic neurophysiology and computational neuronal models to advanced neural interfaces and prostheses currently being actively developed in the field.

Transcript Abbreviation: Group Stud Neureng

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Junior, Senior, Masters, Doctoral

Course Offerings: Autumn

Flex Scheduled Course: Never

Course Frequency: Even Years

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: ECE 3050 or BME 3703, or NEUROSC 3010 and permission of instructor, or graduate standing in engineering or neuroscience.

Exclusions: Not open to student with credit for ECE 5070 or NEUROSCI 5070.

Cross-Listings: Neuroscience 5070

Course Rationale: Introduce students a vibrant, interdisciplinary field which integrates engineering and neuroscience principles for treating neurological disorders.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

Learn how engineering principles are integrated with neuroscience foundations in the development of advanced neuroprostheses.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Overview of Neuroengineering	1.5							
Neuroscience Basics	6.0							
Computational Neuronal Models	4.5							
Neural Interfacing Technologies	6.0							
Overview of Neuroprosthetics	1.5							
Brain Computer Interface	3.0							
Deep Brain Stimulation	3.0							
Retinal Prostheses	1.5							
Functional Electrical Stimulation	3.0							
Optogenetics	3.0							
Neural Imaging	3.0							
Neural Tissue Engineering	3.0							
Regulatory and Ethic Issues	3.0							

Grades

Aspect	Percent
Class Participation and Homework	20%
Midterm I	20%
Midterm II	20%
Final Project	40%

Representative Textbooks and Other Course Materials

Title	Author
<i>Lecture Notes</i>	

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
***	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
**	f	An understanding of professional and ethical responsibility.
***	g	An ability to communicate effectively.
***	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
***	i	A recognition of the need for, and an ability to engage in life-long learning.
***	j	A knowledge of contemporary issues.

Course Contribution		College Outcome
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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